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THE AMERICAN ENGINEER

OFFICIAL PUBLICATION

NEW YORK STATE SOCIETY
PROFESSIONAL ENGINEERS

+ IN THIS NUMBER +

Engineering One or Many Professions

The Engineers License Board

Examination of Candidates

More Effective Registration

FEBRUARY 1931

VOLUME 1 **NUMBER 2**

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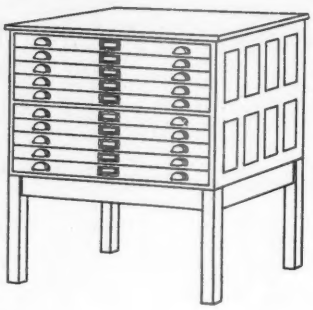

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THE AMERICAN ENGINEER

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ENGINEERING ONE OR MANY PROFESSIONS

Law and Medicine Equally Diversified Callings

The profession of engineering is today, so far as the general public is concerned, the least understood, the least appreciated, and the least recognized of the learned callings. In seeking the cause for this state of affairs one does not have to travel very far into the realm of reason to eliminate the general public as the author thereof and to come to the conclusion that engineers themselves have misled those outside the profession.

That the whole is equal to the sum of its parts and that no part can be greater than the whole are axiomatic to the mathematician, the logician and others engaged in philosophical pursuits. Such premises are equally tenable where human institutions are concerned. True, it is not always easy to identify the whole by the part, but if those callings of life which apply the mathematics, physics and chemistry to the matter of earth are not of common genesis then the precepts of reason are of little value.

Unfortunately, practitioners of engineering are somewhat inclined to scorn abstract reasoning. Such an attitude which savors strongly of unwarranted ego, has however, brought its own reward and a little of the homely philosophy of that great Scotch Bard, Bobby Burns,

"O wad some power the giftie gie us
To see oursels as ithers see us!
It wad frae mone a blemder free us,
An foolish notion."

might well be applied to many of us.

Engineering has become a profession of specialties, but so, too, have law and medicine. The surgeon, the homeopath, the gynecologist, the obstetrician, the psychiatrist, the orthopedist, the pathologist are specialists but they are none the less members of the one medical profession because the premise of their calling is the human body. Think of the scope of a calling that has specialists in civil, criminal, corporation, real estate, admiralty, international, administrative, patent and numerous other branches of what is universally recognized as one profession despite the fact that it deals with laws which differ in every state and nation under the sun. Regardless of countless ramifications the basis is everywhere the decrees of men for their own protection. By the same tenets engineering is as truly one profession premised upon certain physical laws and properties of nature as is medicine or law with its many ramifications and subdivisions.

Two great causes of the lack of recognition accorded the profession are the indiscriminate use of the term engineer and the ever increasing tendency to create many professions out of what is fundamentally one. Engineering is a single profession, based on certain physical laws and properties of nature, and, regardless of specialization in practice should be so considered and so recognized by the public, by engineers and by institutions of learning. Other professions comprehend just as many ramifications but their practitioners have realized the unity of the premises upon which they are predicated.

The engineer himself, together with the institutions of learning, has offended most, by creating and recognizing meaningless and improper names and designations for subdivision of the profession. As an example, civil and mechanical are supposed to distinguish between phases of the profession and in many cases to indicate separate professions. But do they correctly convey their purport? Certainly not to the layman. Even a school boy knows that the terms civil and mechanical are not comparable.

Engineering was originally, and might still be

correctly termed, civil and military to distinguish the works of peace from those of war, but mechanical, electrical, chemical, etc., do not permit of such distinction for they are merely sub-divisions of civil or military engineering. Laymen can hardly be blamed for emulating the profession itself in the indiscriminate use of the term engineer. This is a matter that calls for consideration by practitioners and by directors of engineering education.

The illy conceived idea of sending a boy forth from school trained as a professional specialist is unique with the engineer. No other profession attempts to educate a man as a specialist until the world and the state first recognizes him as a general practitioner and possessed of the basic knowledge common to the profession as a whole. Recognition of professional skill must be the result of actual accomplishment. Regardless of intensive specialistic preparation it is only when thrown entirely upon his own responsibility and resources that a man can develop as an actual specialist and prove his value as a practitioner. In any event, the commonality of fundamental training and knowledge is the basis upon which specialists in any profession build.

The professions of law and medicine are recognized as such not alone by the state as a political entity but by the public at large. Up till within the past few years engineering, which aside from theology requires unquestionably the most intensive scholastic preparation of any profession, was not so recognized even legally. To date its recognition by the public is practically nil. It is only the egotistical engineer, who thinks he is rated by others as he rates himself. To the members of other professions as well as to the layman at large he is some sort of a technician little, if at all, superior in training and knowledge to the electrician, statistician, mechanical dentist, mortician, realtor and countless other more or less technical practitioners. His severe training and magnificent accomplishments are lost sight of.

Engineering is unquestionably the oldest and most accomplished of human professions. Its practice requires a greater breadth of knowledge than any other calling. Its tradition and contribution to the march of civilization warrant recognition from a world which today is entirely dependent upon it for the preservation and progress of that civilization. To establish engineering as a learned profession its unity must be made apparent to the society which it serves. To permit recognization of, or to create divisions thereof, as separate professions is to invite and encourage the confusion that made it possible for another calling to successfully maintain before a Court of Law that there are at least twenty-seven separate kinds of recognized engineers in this state and that the genus ceramic (whatever that may be) is a professional engineer. The power, and the value to society, of a single engineering profession is unlimited; the failure to appreciate and consummate the same invites criticism, misunderstanding and attack and will eventually relegate the engineer to the position of a subordinate technician working only under the direction of others. A house divided against itself cannot survive. The military tactics of Napoleon are apparently more familiar to and better appreciated by others than by members of the engineering profession.

A common basic training, a common desire to protect and promote the public welfare and a common desire for commensurate recognition call for a united profession and the New York State Society affords a common meeting ground for all licensed professional engineers. Its goal is a unified profession. Its hope is the enrolled support of every professional engineer in the State of New York.

EDITOR.

ROY G. FINCH, Secretary

VIRGIL M. PALMER, Past Chairman

THE ENGINEERS' LICENSE BOARD

Personnel and Officers

The New York State Board of Licensing for Professional Engineers and Land Surveyors is now constituted as follows:

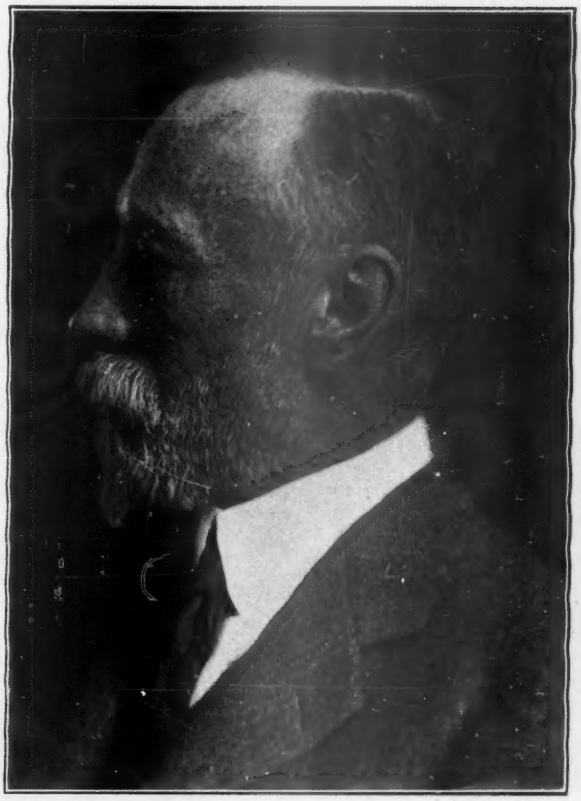
Chairman: A. H. Hooker, Hooker Electro-Chemical Co., Niagara Falls; representing the American Society of Chemical Engineers.

Vice-Chairman: D. B. Steinman, Consulting Engineer, 117 Liberty Street, New York; representing the American Society of Civil Engineers and the New York State Society of Professional Engineers.

Secretary: Roy G. Finch, Consulting Engineer, 112 State Street, Albany; representing the American Society of Civil Engineers.

Member: Virgil M. Palmer, Eastman Kodak Co., Rochester; representing the American Society of Mechanical Engineers.

Member: Erich Hausmann, Dean of Graduate Schools, Polytechnic Institute, Brooklyn; representing the American Institute of Electrical Engineers and the New York State Society of Professional Engineers.



ALBERT H. HOOKER, Chairman

D. B. STEINMAN, Vice-Chairman

In the year 1928-9, the Board received 755 license applications (for P. E., L. S., or both) and passed 421 applicants for license, a ratio of 56 percent passed.

In the year 1929-30, the Board received 843 license applications, and recommended 456 applicants for license, again a ratio of 56 percent passed.

To date, approximately 10,000 professional engineers and land surveyors have been granted licenses in this State, out of a total of about 18,000 such licensees in the entire country.

In the year 1928-9, the total receipts from license fees and renewals under the Engineers' License Law amounted to $21,000 in round numbers. The expenses of administering the law were about $7,000, leaving an unexpended balance of $14,000 turned over to the State Treasury.

(Continued on Next Page)

EXAMINATION OF CANDIDATES

Reprint of Rules Adopted by Licensing Board

The University of the State of New York — Supplement to Handbook 36

Higher Education

ENGINEERING AND LAND SURVEYING
SUPPLEMENT ON EXAMINATIONS
August 1930

The State Board of Licensing for Professional Engineers and Land Surveyors does not accept a record of professional experience as being "of a character satisfactory to the board" or as "warranting the issuance of a certificate" unless such professional experience has a background of preliminary and professional education commensurate with the modern requirements of the competent practice of the respective professions of Engineering and Land Surveying. Under the law, and under the rules and regulations of the board approved by the State Education Department, the board, in order to test such applicants about whose educational qualifications for licensure it is in doubt, sets written examinations through the Department. These are held twice a year, in Albany, Buffalo, New York City and Syracuse, on the following dates in accordance with the subjoined schedule: ENGINEERS' EXAMINATIONS

1931	*1932*	*1933*
Jan. 26-29	Jan. 25-28	Jan. 23-26
June 22-25	June 20-23	June 19-22

Applicants who have attended an approved engineering course of four years or more in a professional school of engineering registered by the Department and who have been graduated therefrom on the basis of examinations set in that institution may present such examinations as a substitute for those required by the board.

Applications for licensure will be received at any time, but no application that is received less than 20 days prior to an examination will be considered until after that examination is held. Applications should be made on forms provided by the Department and filed with the Professional Examinations Bureau of the State Education Department. All evidence of professional experience and responsible charge of work should accompany applications. Each application must be accompanied by a fee of $25 and must be verified by oath. It must show that the applicant has the qualifications enumerated on page 5 of Handbook 36. The daily program of the examination will be as follows:

Mon.	9:15-12:15	Mathematics
	1:15- 4:15	Applied sciences
Tues.	9:15-12:15	Materials of construction
	1:15- 4:15	Structural design and graphics
Wed.	9:15-12:15	Mechanical and electrical design
Thurs.	9:15- 4:15	Civil engineering, mechanical engineering, electrical engineering, mining engineering, or chemical engineering

The passing mark in each subject shall be 75 per cent.

(Continued on Next Page)

ERICH HAUSMAN

THE ENGINEERS' LICENSE BOARD

(Continued from Page 5)

In the year 1929-30, the total receipts were approximately $35,000, the administrative expenses were about $13,000, leaving a balance of $22,000 for the State Treasury.

The Board receives and gives consideration to as many as 300 applications for license in a month. The work generally consumes from five to seven days per month for each member of the Board. Someone has to do it, and the members of the Board make this sacrifice to serve the engineering profession.

During the past year, the Board conducted revocation preceedings on charges filed against three licensed professional engineers and land surveyors. In one case the charges were found not sustained and were dismissed. In two cases, the Board found cause of action, and recommended revocations of the respective licenses, one in professional engineering and the other in land surveying.

Any candidate who fails in only one subject will be considered as conditioned in that one subject and may remove this condition at any subsequent examination without additional fee. In case he fails in more than one subject, the board may require him to be re-examined in all subjects. Not more than two complete examinations shall be taken on one fee.

Scope of Examinations. The written examination is divided into two parts: Part I covers the fundamental professional education given in standard engineering school as an essential foundation for practice in *all* branches of the profession. Part II covers the more advanced and specialized professional education given, in addition to the common fundamental professional education, to students in the respective major branches of engineering, namely civil, mechanical, electrical, mining, and chemical engineering. In order to qualify as passing the board's written examination, the applicant must successfully pass all divisions of Part I of the examination and, in addition, one division (selected at his option) of Part II of the examination, unless exempted for cause from any of the divisions by the board.

PART I

(The examination covering Part I occupy three days. The applicant is required to pass in *all* of the required subjects of Part I.)

Mathematics (including advanced algebra, logarithms, plane and solid geometry, plane and spherical trigonometry, analytical geometry, differential and integral calculus).

Applied sciences (including physics, mechanics, statics and dynamics, hydraulics, thermodynamics, electricity, electro-magnetism, chemistry, qualitative analysis, economic geology, geodesy).

Graphics (including descriptive geometry, mechanical draughting, structural draughting, graphic statics, kinematics).

Materials of construction (including elasticity and resistance of materials, steel, reinforced concrete, masonry construction, timber construction, fireproofing, metallurgy, mineralogy).

Structural design (including stress analysis, design of wind bracing, beams, slabs, columns, girders, trusses, foundations, retaining walls, abutments, structural details and connections, building codes, loadings, unit stresses).

Mechanical design (including power, heating and ventilating, prime movers, machine elements, stresses in machine parts, boiler design, kinematics, mechanical transmissions, elevators, engineering thermodynamics, water power).

Electrical design (including electrical measurements, laws of electricity and electro-magnetism, electrical equipment, wiring and insulation, direct and alternating current circuits, types and characteristics of motors, generators, transformers and converters).

Administration (including engineering economics, accounting, business law, corporation finance, valuations, contracts and specifications, professional practice and professional ethics).

PART II

(The examination covering Part II occupies the fourth day of the written examinations. The applicant is required to pass one of the following five divisions, selected by him.)

Civil engineering (including advanced surveying and geodesy, city planning, structural engineering, sign, boiler design, steam engineering, steam engineering architecture, highway engineering, municipal engineering, water supply, sanitary engineering, water power engineering hydraulic design, design of dams, tunnels, railway engineering, canals, rivers and harbors, port development, engineering economics, specifications and contracts).

Mechanical engineering (including machine design, boiled design, steam engineering, steam engines, steam turbines, oil engines, compressors and fans, elevators, machine tools, power plants, heating and ventilation, internal combustion engines, pumps and hydraulic machinery, industrial plants, power plant buildings, industrial management).

Electrical engineering (including direct current systems, alternating current systems, illumination engineering, motors, generators, transformers, conversion equipment, power stations, distribution systems, transmission lines, electric railways, electrical communication, radio communication, wiring codes, electrical machine design).

Chemical engineering including industrial economic and dynamic geology, petrology, assaying, prospecting, development and mining methods, excavation and tunneling, boring and shaft sinking, design of mine plant, hydrometallurgy, ore dressing, mill design, mine administration and accounts, mining laws).

Chamical engineering including industrial chemistry, organic chemistry, industrial electrochemistry, factory practice, industrial water supply and waste disposal, quantitative analysis, physical chemistry, chemical process development, chemical engineering administration, applied colloid chemistry, chemical plant design).

LAND SURVEYORS' EXAMINATIONS

Written examinations for land surveying are held twice a year in Albany, Buffalo, New York City and Syracuse, in accordance with the subjoined schedule:

1931	*1932*	*1933*
Jan. 30	Jan. 29	Jan. 27
June 26	June 24	June 23

Applicants who have successfully completed the first two years of a recognized course in civil engineering, including all courses in surveying, in a school registered in whole or in part by the Regents for such purpose, and have passed the required examinations set in that institution, may present such examinations as a substitute for those required by the board.

Applications for licensure will be received at any

(Continued on Page 20)

DRAFT OF PROPOSED AMENDMENT TO N. Y. STATE LICENSING LAW

Prepared by the Legislative Committee and submitted to all Co-operating Societies, Chapters and Publications (Dec. 29, 1930)

Section 1457. Qualifications; Examinations; Fees

(To Replace Present Section 1457) (Slightly Modified Since Dec. 29, 1930)

The department, on application therefor on prescribed forms and the payment of fees as herein provided, shall, on the recommendation of the board, issue licenses for the practice of professional engineering and/or land surveying to any person who meets the requirements as heretofore set forth.

The board shall set up and annually publish the plan, scope and requirements of written examinations for licensing of professional engineers and land surveyors, respectively. The examinations shall be in English and shall cover the required basic education in the mathematical and physical sciences as applied to engineering and surveying and the professional education required for the modern practice of professional engineering and land surveying, respectively, together with such other subjects as the board shall prescribe, and shall be held twice annually in at least three convenient places in this state. These written examinations may be supplemented by such oral examinations and further tests as the board may prescribe.

The granting of serial examinations and credits and the scope and terms of re-examination shall be determined by the board.

For license as a professional engineer, the applicant must show to the satisfaction of the board that he has complied with all of the following requirements:—

1. Is more than twenty-five years of age;
2. Is a citizen of the United States or has legally declared intention of becoming such citizen;
3. Is of good character and repute;
4. Has successfully completed a four years' high school course approved by the department, or the approved equivalent thereof;
5. Presents evidence of such further preliminary and general education as the board may determine;
6. Has had eight years or more of practical experience in professional engineering work of a grade and character satisfactory to the board indicating that the applicant is competent to perform responsible professional engineering work, and
7. Successfully passes the examinations for professional engineering prescribed by the board.

For license as a land surveyor, the applicant must show to the satisfaction of the board that he has complied with all of the following requirements:—

1. Is more than twenty-one years of age;
2. Is a citizen of the United States or has legally declared intention of becoming such citizen;
3. Is of good character and repute;
4. Has successfully completed a four years' high school course approved by the department, or the approved equivalent thereof;
5. Presents evidence of such further preliminary and general education as the board may determine;
6. Has had six years or more of practical experience in land surveying work of grade and character satisfactory to the board indicating that the applicant is competent to perform responsible land surveying work; and
7. Successfully passes the examinations for land surveying prescribed by the board.

Prior to January first, nineteen hundred and thirty-seven, the board, at its discretion, may accept a diploma of graduation from an approved engineering course of four years or more, in an engineering college or school registered by the department as of approved standing, as evidence of professional education in lieu of all or part of the prescribed examinations for professional engineers or land surveyors.

Each year of engineering study satisfactorily completed in a college or school of engineering registered by the department as of approved standing may be credited as equivalent to one year of the required practical experience.

New York engineering schools and New York engineering students shall not be discriminated against by registration of any school out of the state whose minimum requirements are less than those fixed for New York engineering schools.

The board, at its discretion, may waive specific requirements or may substitute practical examinations therefor in exceptional cases of professional engineers of long established standing and recognition in the profession, who may wish to practice in this state. Membership of a grade acceptable to the board in a national engineering society recognized by said board as maintaining the highest standards of qualification, or a record of established practice as a professional engineer, or land surveyor as the case may be, prior to the original enactment of this licensing law in 1920, shall be evidence for such exemptions, when supplemented by further evidence and certification of character, competency and qualifications as the board may require.

(Continued on Next Page)

ENGINEERING A LEARNED PROFESSION

BY DR. D. B. STEINMAN

President, New York State Society of Professional Engineers

We must pursue all means and exert every effort to impress this fact upon the public, in order that current misconceptions of our professional status may be corrected.

Contrary to the false impressions conveyed by the widespread unlawful misappropriation of the designation "engineer," and by the unprincipled misleading advertisements of correspondence schools, there is no short-cut to professional standing in Engineering.

In order to equip himself for his high professional service to mankind, the Engineer has to undergo a most rigorous course of training. In addition to having the necessary native talents of ingenuity and resourcefulness, he has to give years of his life and spend thousands of dollars in preparation for his lifework. He has to master the natural sciences; he has to equip himself with a thorough knowledge and understanding of the strength of materials, the analysis of stresses, the principles of structural, mechanical and electrical design. He has to supplement this technical training with a study of economics, finance, management and human engineering,—the handling of men and organizations. Many an Engineer takes a complete college course in the liberal arts and sciences, for cultural preparation and background, before entering upon the more arduous and technical professional training in the engineering school or university. The professional course requires at least four years of the most intensive study together with long hours of design and laboratory practice. With the increasing content and complexity of modern engineering knowledge, there is of necessity a growing tendency to lengthen the required period of university training, and leading engineering schools now impose five years, and even six years, of technical instruction before the engineering degree is conferred.

As a rule, only the more intelligent college students choose the study of engineering. It is well known that college engineering courses are the most difficult that a young man can take. Many fall by the wayside, and only the most intelligent and capable succeed in completing the long and arduous course of training.

Following the completion of this highly exhaustive professional education, the engineering graduate invests many more years of his life in a virtual apprenticeship, in order to secure practical experience to supplement his technical training.

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DRAFT OF PROPOSED AMENDMENT

(Continued from Page 8)

The board may, at its discretion, exempt from examination an applicant who holds an unexpired license to practice professional engineering, or land surveying as the case may be, issued to him by a legally constituted board of examiners in the District of Columbia or in any state or territory of the United States, or by the National Council of State Boards of Engineering Examiners, provided that the minimum qualification requirements for such license or registration are of a standard not lower than those prescribed in this state.

Subsequent to January first, nineteen hundred and thirty-seven, every candidate for examination for a license to practice as a professional engineer shall present evidence that he has graduated from an approved engineering course of four years or more in an engineering college or school approved by the department as maintaining satisfactory standards, and that prior to the beginning of his course of study in such college or school of engineering he satisfied the pre-requisites for admission thereto. In lieu of the completion of the prescribed course of study in a registered school of engineering, an applicant may be admitted to the examinations only upon presenting satisfactory evidence that he meets all other requirements and in addition has had twelve years or more of practical experience in professional engineering work of a grade and character satisfactory to the board.

An engineer who is not a citizen of the United States or who has not declared intention to become a citizen and whose credentials show that he is of established and recognized professional standing in his own country and who presents certification of character and qualifications from at least two licensed professional engineers in this state may, upon recommendation of the board and the payment of a fee of $25.00, be granted a temporary permit to practice professional engineering in connection with any specific project. This permit shall not entitle the permittee to practice engineering except in connection with the specific project for which it was granted. The sections of this article relevant to the expiration, renewal and revocation of licenses shall be applicable to permits. The department shall include in the annual roster a separate list of persons to whom permits to practice engineering have been granted.

Every person applying for examination or certificate of license under this article shall pay a fee of twenty-five dollars to the department, except in cases where the application is for license to practice professional engineering and land surveying when the fee shall be thirty-five dollars. Fifteen

(Continued on Next Page)

MORE EFFECTIVE REGISTRATION

BY C. J. ULLRICH, Past President, American Association of Engineers

Whatever laxity there may be, generally speaking, in the application of Engineers Registration Laws, one state, at least, is in the future going to make registration the real criterion of competency to practic engineering within that state. The New York State Board of Engineering Examiners took a step forward in the realm of registration for engineers when it announced that hereafter all applicants for registration, who are not graduates from a recognized engineering school, will have to pass a four days' examination, three of which are to be devoted to the fundamentals of engineering and the fourth to the particular branch in which the applicant has specialized. This move on the part of the New York Board is a concrete attempt to raise the standards of the profession through the medium of registration.

The Engineering Profession has lately come to realize two things about registration; first, that registration of engineers has come to stay and, second, that the profession must assume responsibility for the type of registration laws placed on the statute books. Many of the new existing laws, due to a division of opinion within the profession as to the propriety of registration for engineers, represent a compromise between opposing forces, rather than the best interests of the public and the profession. As such, these laws are not all that they should be and the profession at large must now assume responsibility for their shortcomings.

Within the past year there has developed within the profession a tendency to stiffen up on the requirements for registration and the action taken by the New York Board may be considered as a translation of this tendency into practice. Of course, there are going to be some protests against such a policy, primarily from non-graduate engineers and from Engineering Trade and Correspondence Schools. Such protests will probably maintain that the policy adopted by the New York Board discriminates against non-graduate engineers. But does it? A certificate of graduation from a recognized engineering school is notice to the public that the holder of such a certificate or diploma has acquired a certain degree of proficiency in the fundamentals of engineering. The New York Board has merely adopted the standard required for graduation by these schools as the standard of educational training necessary for admission to registration within the state. In other words, it says to the non-graduate you have no institution to vouch for your technical training, we have no knowledge of what your training has been or whether you have acquired those fundamentals necessary to the practice of engineering, therefore you must prove to us through examinations that you have acquired the technical training and knowledge which we consider a prerequisite for admission to registration. This is not discrimination against the non-graduate, rather it is putting all applicants for registration on the same educational standard or basis. And why not? Is there any reason why the young man of today who wishes to enter the engineering profession and who has not had the proper collegiate engineering

(Continued on Page 21)

DRAFT OF PROPOSED AMENDMENT

(Continued from Page 9)

dollars of the application fee shall be retained as an examination fee, and ten dollars shall be retained for each license granted or shall be returned to the applicant for each license denied.

SECTION 1466. PROFESSIONAL ENGINEERING (TO REPLACE PRESENT SECTION 1466)

Professional engineering, as used in this article, shall be understood to mean the rational application of the principles of mathematics, the natural sciences, and economics, to the investigation, planning, design, development, construction and/or administration, of structures, machines, equipment, plants, processes, works, mills, mines, cities, highways, railways, waterways, harbors, water supply, sanitation, transportation, communication, power, heating, lighting, fire protection, ventilation, drainage, irrigation, flood control, airports, airways, municipal improvements, and/or other constructive works.

The term "structures," within the meaning and intent of this article, shall be understood to include all constructions having as essential features foundations, columns, girders, trusses, arches and beams, any or all of these and/or other parts, in which safe design and construction require that loads and stresses be computed and the size and strength of parts be determined by mathematical calculation based upon scientific principles and engineering data; and shall include such structures as may be covered by the term "buildings" as defined in any act in force in this state relating to the regulation of the practice of architecture.

The use of the designation "engineer" with or without qualifying adjective on any sign, card, letter, letter-head, device, advertisement, listing, report, or plan, when such designation may or is intended to convey the impression that it signifies professional qualification, shall be considered as offering to practice professional engineering, and such use by any resident of this state who is not duly licensed as a professional engineer shall be unlawful.

A NATIONAL BUREAU OF ENGINEERING REGISTRATION

A System for Establishing Higher Standards of Engineering Training and Qualifications

By T. KEITH LEGARE

President, National Council State Boards Engineering Examiners;
Chairman, Committee on Registration of Engineers, Am. Soc. C. E.

The engineering profession has now realized the need of higher standards of engineering training, both as to education and practical experience, judging from the interest taken in the recommended uniform registration law, the action of the New York Board in requiring examinations of non-graduate engineers, and editorials appearing in recent issues of *Engineering News-Record* and *Professional Engineer*, the state laws have different requirements for the registration of engineers the requirements for membership in engineering societies vary and the qualifications of an engineer are not clearly defined or agreed upon. In view of these facts, it seems of prime importance that some method be devised which will definitely establish just what these standards should be and then provide for the progressive rating of engineers in accordance with their qualifications.

The code of ethics, so often referred to, will be honored by the engineer whose standard of conduct is based on honor and high ideals, but it is necessary to have legal protection for the public and the profession in order to prevent the practice of incompetents who cannot, or will not, prove their qualifications. Those members of the engineering profession who have served many years on State Boards, well know from actual experience in administering engineering registration laws that registration has contributed much toward the raising of professional standards and it will be necessary for the various State Boards to continue to function, but it is important that some specific organization co-operate with and definitely assist these Boards in securing more uniform results.

It is proposed that a National Bureau of Engineering Registration be established and the logical body to sponsor such a bureau is the National Council of State Boards of Engineering Examiners, but it should be established and operated under the direction of a board consisting of officially appointed representatives of the following organizations: American Institute of Chemical Engineers; American Society of Civil Engineers; American Institute of Electrical Engineers; American Society of Mechanical Engineers; American Society of Mining and Metallurgical Engineers; American Association of Engineers; Society for the Promotion of Engineering Education; and National Council of State Boards of Engineering Examiners.

This Bureau shall first adopt minimum requirements for the practice of professional engineering which could be divided into three grades, such as, Student Engineer, Junior Engineer, Senior Engineer. Certificates of registration, based on a complete written record carefully verified by the Bureau, would be issued by the Bureau to applicants complying with these requirements. Applicants who are not graduates of approved engineering colleges or whose experience record alone does not warrant the issuance of a certificate of registration could be required to pass an examination and these examinations could be given by the registration board in the state of which the applicant is a resident or by some examining board appointed by the Bureau. A system of credits might be established and when the engineer has obtained a certain number of credits, this would be considered as equivalent to an examination. The Bureau could be made self-supporting by charging fees for certificates of registration, but it would very probably have to be financed during its organization period.

It is believed that if this Bureau is operated on such high standards as its importance demands, the certificates of registration issued by it will be accepted and recognized by all State Registration Boards, thereby creating a workable and satisfactory system of reciprocal registration for engineers, which is so greatly needed. The Bureau's certificates of registration would probably be accepted by engineering societies as evidence of qualification for membership and might also be considered as warranting the award of professional degrees by engineering colleges.

A much needed and very important work that should be undertaken by the Bureau is the prescribing of a formal procedure of education and training for all who would become members of the engineering profession and the definite recognition of such training when it has been acquired. A higher standard of engineering work will be created only when a well defined system is adopted whereby the engineering student, either in college or employed, knows in advance just what the requirements for practicing professional engineering will be and is assisted in preparing himself to meet

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MIGHTY ST. LAWRENCE

BY LESLIE ROBERTS

The St. Lawrence River system seems destined to be the spine of a waterway that will open a vast continent for world commerce.

Courtesy "The Rotarian"

A mighty water highway that finds its western terminus beside the ore cluttered wharves of Duluth, or the mammoth elevators of Fort William that bulge their seams with grain; a highway driven through the roaring wastes of Superior, across the bosom of Huron and through quickly angered Erie; a road to distant Cathay which skirts torrential Niagara as it goes, crosses Ontario, basks in the beauty of the Thousand Isles, skirts the white-whipped waters of the Long Sault and Lachine and rests a while in the quiet sanctuary of Montreal's port, still a thousand miles from the sea; a road which reaches on beyond the bluff promontory of Quebec into the rolling, salt-tanged swells of Point au Pere and the Gulf, thence through Gulf and Strait into Mother Atlantic and on to the far-flung corners of the world.

. . . who can wonder that Indians dwelling on its banks, four hundred years ago, told a mariner of Old France that he had come to The River That Has No End? Who shall wonder if today this mighty Saint Lawrence highway is destined to become the busiest of all water trade routes?

The Great Lakes-Saint Lawrence Deep Waterway of the future, its protagonists aver, will be the spinal column of North American commerce, a transport thoroughfare leading from the teeming mid-western states and Canada's prairie provinces through a new gateway to world markets. And pessimistic Jeremiahs and the plaints of sectional prophets to the contrary, a great public opinion on either side the international boundary today ranges solidly behind deep waterway development of the River That Has No End.

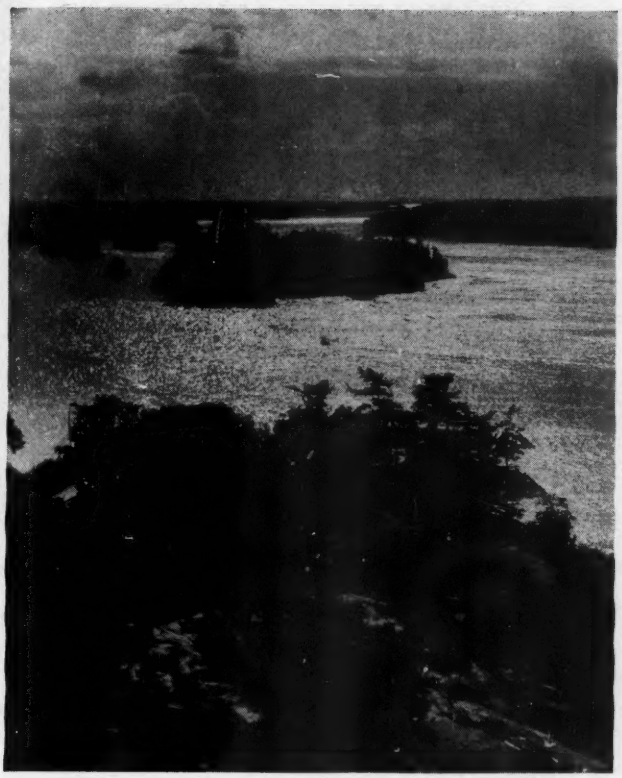
The Great Lakes-Saint Lawrence Waterway divides sharply into three navigation zones. From the Atlantic Ocean to the Port of Montreal the present ship channel permits its passage for vessels of thirty-foot draught and is being dredged to a depth of thirty-five feet at this writing. Immediately to the west of Montreal is found a region of alternating broad basins and rapid shallows, approximately one hundred miles in length, at present adapted only for fourteen-foot shipping.

The third zone lies west again and reaches for more than a thousand miles into the heart of the continent, embracing the upper reaches of the Saint Lawrence, all the Great Lakes and the connecting channels and canal systems essential to shipping in this region. Vessels of a maximum draught of twenty feet may now ply from the head of the lakes as far east as the ports of Kingston, Prescott, and Ogdensburg, a total distance of more than one thousand miles.

Ships from the far-off corners of Christendom ply inland from the sea to Montreal, again a distance of one thousand miles. In between is a brief water haul of little more than one hundred miles, or approximately five per cent of the entire waterway, passable only to medium size and small craft. That is the Great Lakes-Saint Lawrence Waterway of today.

The Great Lakes-Saint Lawrence Waterway of tomorrow would unite these three zones into one great navigable highway, accessible throughout to ships drawing twenty-five feet of water. Present channels of the twenty-foot depth would be carried down to meet the twenty-five foot schedule, much of this work having already been carried out. At such points as Sault Sainte Marie, locks would be altered or renewed to meet the new circumstances. Between Montreal and the sea no works are required. Re-channeling and re-canalization of the in-between region would constitute the lion's share on the enterprise.

Completion of this $800,000,000 project would release the land-locked fleet that is confined to the inland seas, making the ports of the world its trading constituency, should ship-owners consider such distant travel desirable. Simultaneously it would fling open portals of trade in the heart of America to eighty-eight per cent of the ocean-going merchantmen which now reach journey's end in coastal ports.



Sunset in the Thousand Islands. A twenty-seven foot channel is being dredged through this scenic region.

From the purely Canadian view, however, the greatest advantage lies in the fact that the huge grain carriers from the Upper Lakes would discharge their wheat into the elevator of Montreal and Quebec for subsequent transfer into ships bound to the four corners of the earth, jettisoning the costly system of breaking bulk cargoes from the Upper Lakes into five and six parts for small ships to carry through the shallow water zone. Freight rates would fall; congestion due to insufficient railway facilities in America's inland empire would be relieved; while, as a secondary issue, the greatest storehouse of electro-energy in North America—a total of five millions of horse power, of which more than two millions lie in the international river—would become available for immediate development.

This, then, is the Saint Lawrence Waterway of tomorrow, as culled from the words of the prophets. This is no new-born dream hatched in the agile brains of the profit-hunter, the election-seeker, and the promoter. As far back as 1895 there were inter-governmental gestures, and in 1902 an international investigating commission was appointed. Then ensued long discussions and editorial fusillades.

Several controversial points were raised by this airing of opinion, and in the midst of its post-war continuance, the governments in Washington and Ottawa referred the subject in its entirety to the International Joint Commission.

In January, 1922, the commissioners reported unanimously to their respective governments and suggested the creation of a treaty, particularly in regard to improvements to navigation between Montreal and Lake Ontario. They advised that such works as law wholly within the borders of one country be maintained and operated by that country, subject to inspection by an international board, that the cost of all navigation works be apportioned between the two countries on the basis of the benefits to accrue to each and that the cost of works for the combined uses of navigation and power, over and above the cost of works for navigation alone, should be equally apportioned.

Here, at last, was something tangible and unbiased which the newspaper reader could take between his teeth. Widespread discussion again ensued in republic and dominion. In Washington, the New York cohorts again entered the fray and urged abandoning the Saint Lawrence and the immediate construction of an enlarged Erie Canal. In Canada interests centered in Montreal, and the Province of Quebec launched thunderbolts on the heads of the protagonists of the project. Inland, and particularly in the Great Lakes states and the Province of Ontario, others rushed to defend the

With channel-deepening already begun in the Thousand Island and Soulanges sections, the crux of the project is now in the Rapids and Lachine regions.

report and called for immediate application of its recommendations.

American opinion crystallized when the federal administration approved the scheme and instructed Secretary Hughes to notify the Canadian Government of Washington's desire to implement the report by treaty. Canada, however, asked for time to study the recommendations of the commissioners and the joint board of engineers.

The present finds each major political group in Canada committed to a policy of finding the best possible solution and, in due course, to seeing that solution through to its end. To the Dominion's credit it must always be remembered that though refraining from the final commitments of partnership with the United States—partially because of the magnitude of the costs to be undertaken and partially because it takes time to create an informed national public opinion—she has proceeded with key works at great cost to her national treasury. The United States—through no fault of her own, it is true—has stood by and done nothing. Here, at least, is proof of Canada's *bona fides*. All that now remains for settlement is the item concerning international waters, in the region where Ontario meets New York in midstream.

Inasmuch as successive American administrations, including the Hoover Government, have endorsed the joint commission's recommendations and the subsequent report of the wholly American Saint Lawrence Commission, following this approval by formal requests for a treaty, the lay mind is bound to wonder what reasons have been at the root of Canada's refusal to sign articles of partnership.

The hue and cry of the die-hard nationalist has had much to do with the confusion, and the need for complete information on the part of the Canadian people has been another contributory cause. Cost and the absence of the urgent need which impels the United States to quick action are other factors which have played important parts in the formation of Canadian policy.

During the life of the recently deposed MacKenzie King government, it was always the contention of the prime minister's opponents that he was too friendly with the United States and, if you please, was engaged in the sale of our good Canadian souls into American industrial bondage. The theory was far fetched, but it was the sort of groundless theory which permits of violent exposition on the hustings and it contributed in no small

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ENGINEERING ACHIEVEMENTS OF 1930

How many are aware of the fact that:

The two longest steel arches in the world were closed: the Kill van Kull Bridge at New York with a 1652-ft. span, and the Sydney Harbor Bridge in Australia with a 1650-ft. span.

Final work was done on the new Welland Canal, a mammoth structure built by Canada to pass seagoing lake grain vessels up and down the 326.5-ft. difference in elevation between Lake Erie and Lake Ontario.

The Detroit-Windsor vehicular tunnel, connecting Canada and the United States beneath the Detroit River at a cost of $25,000,000, was completed and opened to traffic.

The U. S. Department of the Interior began preliminary work on the construction of the 730-foot Hoover Dam, to be the highest in the world, a part of the Boulder Canyon project on the Colorado River.

The cables were completed for the Fort Lee suspension bridge across the Hudson River at New York, with a main span of 3500 ft., the longest in the world.

The highest boiler pressure ever used in America, 1800 pounds per square inch, was employed in a 6000 kilowatt power plant nearing completion at Lockland, Ohio.

The first completely welded ocean-going cargo vessel was launched at Charleston, South Carolina.

An elevated Monorailway 30 miles long, carrying a propeller-driven car which travelled 120 miles per hour, was completed near Glasgow, Scotland.

An experimental boiler designed to operate at pressures ranging from 3,500 to 4,500 pounds per square inch and a temperature of 833 degrees Fahrenheit was built.

Construction progressed on the world's largest hydro-electric power plant, the Dneprostroy project in Russia, which will have an ultimate capacity of 750,000 h.p., with the largest hydro-generators of 77,500 kilovolt capacity with turbines of 84,000 h.p. capacity.

After a third attempt, Prof. Georges Claude was successful in obtaining power from the temperature difference in the ocean water at the surface and in the depths of the tropical seas off the Cuban coast.

Natural gas was piped as far as 1,000 miles to centers of population, marking a further invasion of the city gas business by natural gas and its by-products, propane and butane, and petroleum refinery gas.

A streamlined railway car driven by a 400 h. p. airplane engine and propeller sped more than 100 miles per hour on a straight track in Germany.

The world's longest-span concrete arch bridge was built at Brest, France, with three spans, each of 612 feet.

The application of welding to steel building construction was greatly extended, the number of such buildings being increased 50 percent.

The first roller-bearing locomotive was built and put in service.

Chicago's Merchandise Mart, said to be the largest building in the world, was completed.

A radio telephone service was installed between New York and Buenos Aires, making possible the connection by radio-phone of four continents—North America, South America, Europe and Africa.

Construction of the world's longest-span rope-strand suspension cables was completed for the St. Johns Bridge at Portland, Oregon, with a main span of 1,207 feet.

Construction advanced on the world's largest high pressure turbine-generator, a 110,000 kilowatt steeple compound unit to operate at 1,200 pounds per square inch pressure, in the River Rouge power plant near Detroit.

The Europa, new German ocean liner, entered service and became speed queen of the North Atlantic by bettering the record of her sister ship, the Bremen.

Progress in the design of windowless buildings, lighted and ventilated entirely by artificial means, was made and plans were announced for the construction of a $1,500,000 windowless factory at Fitchburg, Mass.

The U. S. Bureau of Standards prepared for the construction of a National Hydraulic Laboratory provided for by Congress at a cost of $350,000.

Plans were made and bonds authorized for the $35,000,000 Golden Gate Bridge at San Francisco, the center suspension span of which will be 4,200 feet, the longest in the world.

A PRACTICE INIMICAL TO PUBLIC AND PROFESSION

Competitive Bidding Provided for by Board of Estimate On City Work Including New Maps.

Item appearing in Mount Vernon Argus, Dec. 12, 1930

"Civil engineers and surveyors who have been engaged to draw maps and establish new street lines at set-up prices will be required to submit bids for the work, according to a decision of the Estimate Board this morning in refusing to name a surveyor or fix the price to be paid for drawing a map showing the new lines on East and West Lincoln avenues from North Columbus Avenue to Scott's Bridge.

"The board had before it a revised ordinance, adopted last Tuesday by the Aldermen to conform with the Mayor's request. Two weeks ago the Mayor vetoed an ordinance which named a certain engineer to do the work at a price not to exceed $2,000.

"In this connection, Comptroller Bateman moved that as no definite price could be determined for the work, the city allow the three authorized civil engineers in Mount Vernon to submit bids."

The Society took cognizance by submitting through its Committee on Ethics and Practice, the following communication.

December 26, 1930.

Hon. James Berg, Mayor,
City of Mt. Vernon,
Westchester County,
New York.

Dear Sir:—

At the meeting of the Executive Board of the New York State Society held December 15th attention was called to an article appearing in the Mount Vernon Argus of issue December 12, 1930, relevant to the engagement of engineering services on a basis of competitive bidding.

The Society suggests that the practice of securing professional services by such means is detrimental to the public welfare and is considered unethical by all recognized professions.

If professional men are to render full and unbiased services they must be free from competitive urge and from the circumscription accompanying agreements predicated upon unsound principles.

The City of Mt. Vernon would not consider engaging the services of lawyers or doctors upon the basis of competitive bidding and to retain an engineer under such circumstances is equally unwise. The engineering profession, through its national societies and particularly in this State through the New York State Society of Professional Engineers, strongly condemns and considers unethical the practice of securing, performing or awarding work on a competitive basis.

Paragraph 2, Section D, of the Code of Ethics of the Society reads as follows:- "The engineer shall not enter into competition for, nor attempt to secure professional work awarded on a basis of competitive bidding. Such practice is detrimental to the public welfare, degrades the profession and is strongly condemned."

The City of Mt. Vernon is urged to reconsider the policy proposed and to bear in mind that engineers, as professional men, are not alike and equal in all respects any more than are lawyers and doctors.

Trusting that consideration of the public good is sufficient extenuation for this communication and assuring you that the New York State Society of Professional Engineers is at your service in connection therewith, I am, Sir, at the request of the Executive Board of the Society,

Respectfully,

ARTHUR V. SHERIDAN,
Chairman, Committee on
Ethics and Practice.

SOCIETY NOTES

Headquarters at Albany

The personnel of the committee appointed by President Steinman to study and report on the establishment of permanent headquarters for the Society in Albany is as follows:

Arnold G. Chapman, Albany County; Harold G. Rice, Oneida County; Fletcher H. Burke, Erie County; Edgar A. McKenna, Queens County; P. M. Corry, Bronx County.

If you have any suggestions kindly forward the same to Society Headquarters.

Vote on Change of Society Name

The vote on the change of name of the society as reported by the Committee consisting of H. H. Holst, P. M. Corry, and E. A. McKenna is as follows:

In favor of	483
Opposed	6

Inasmuch as the vote complies with the require-

ments of the Constitution the official name of the Society is now—"The New York State Society of Professional Engineers." The size of the vote, however indicates the usual indifference of Engineers. Scarcely more than 25% of the membership expressed itself.

A Director of Chapter Activities

At the December meeting of the Executive Board there was created the position of Director of Chapter Activities. Raphael J. Smyth, President of Bronx County Chapter, the oldest and possibly the most active Chapter in the entire state, was unanimously chosen to fill the role created.

His ability and untiring efforts have placed the Bronx Chapter on a par with the Bar Association and Medical Society of that county and have brought much recognition to the engineering profession in that part of New York. Mr. Smyth will enter in communication with and offer suggestions to all Chapters in the State. Every Chapter is urged to respond and co-operate with him.

Membership

The Executive Board at its meeting in New York on December 15th adopted a policy intended to increase the influence and sphere of the Chapter.

In the future membership, from counties where Chapters exist, must be through the Chapter. This shall not apply to those who are already members of the Society but such members are urged to join a Chapter and to subscribe to the policy of extending and developing the Chapters throughout the State.

Comments: Records of the Financial Secretary show that Onondaga and Suffolk Chapters had a 100% paid up membership for 1930. Nassau ranked third with 97%, Erie brought up the rear guard far removed from all others. How about 1931 Erie?

Co-operation from Outside the Profession

STROMBERG-CARLSON TELEPHONE
MANUFACTURING COMPANY
100 Carlson Road
Rochester, New York

The New York State Society
of Professional Engineers,
Grand Central Terminal,
New York, N. Y.

Attention: D. B. Steinman

Gentlemen:

Thank you for the additional information given in your letter of December 26.

As I previously assured you, by my letter of December 22, Stromberg-Carlson has no intention of continuing the abuse of the use of the word "engineer."

We have instructed our agency to discontinue the use of the word "engineer" in connection with "service men."

Very truly yours,
(Signed) W. T. EATWOOD,
Advertising Manager.

In behalf of the Engineering Profession THE AMERICAN ENGINEER acknowledges the co-operation and courtesy of the Stromberg-Carlson Telephone Manufacturing Co.

Winter Meeting of Society

FEBRUARY, 1931

In keeping with expectations Albany County came forward with an invitation to hold the next meeting of the Society at the Capital of the State.

At the meeting of the Executive Board held in December it was voted to hold the meeting of the Society at Albany during the month of February.

Edgar A. McKenna was appointed State Chairman with Past President Arthur V. Sheridan, Vice-Chairman and C. R. Vanneman, President of Albany Chapter as Local Chairman to arrange for details. Chairman Vanneman will appoint local committees who will co-operate in arranging for the program of the meeting which will be held in Albany, February 9th and 10th, 1931, in the Hotel Ten Eyck.

The tentative schedule follows:—

Monday, February 9th, 7:30 P. M.—Visit to Legislative Halls. Senate and Assembly will be in session.

Tuesday, February 10th, 10:00 A. M.—Meetings of committees with visitors and delegates of co-operating societies and colleges in attendance.

2:00 P. M.—Winter meeting of society. All members, guests and friends in attendance.

7:00 P. M.—Dinner at Hotel Ten Eyck. Everyone invited and urged to be present.

Every Chapter must be represented.

On to Albany;—to the scene of the pending legislative campaign.

Organizations Co-operating on Legislation

In response to the invitation of the New York State Society of Professional Engineers, the following national and local engineering organizations have named representatives to co-operate in the legislative program:

American Society of Civil Engineers (New York Section and Syracuse Section).

American Society of Mechanical Engineers (National organization).

American Institute of Electrical Engineers, (National organization).

American Institute of Chemical Engineers (National organization).

American Institute of Consulting Engineers (National organization).

American Association of Engineers (National

organization, and New York Chapter).

Structural Engineers Society of New York.
Albany Society of Engineers.
Municipal Engineers of the City of New York.
Westchester Engineering Society.
Brooklyn Engineers Club.
Association of Engineers of New York, Inc.

This is a most gratifying manifestation of solidarity and co-operation within the engineering profession. The combined membership of the organizations listed is over 50,000. It is probably the first time in the hostory of the profession that so many representative national and local engineering organizations have united their interests and efforts in a single cause.

To a large extent, the co-operating organizations designated, to represent them, engineers who were already on the legislative committee of the State Society. With the additional names that have been designated, the present personnel and representation of the joint legislative committee are as follows:

JOINT LEGISLATIVE COMMITTEE

Arnold G. Chapman, Albany, (Chairman). N. Y. State Society of P. E.

H. G. Balcom, New York. N. Y. State Society of P. E.

V. T. Boughton, New York. N. Y. Section, Am. Soc. C. E.

H. A. Kidder, New York. Am. Inst. of E. E.; N. Y. State Soc. of P. E.

George C. Diehl, Buffalo. N. Y. State Soc. of P. E.

Sigmund Firestone, Rochester. Am. Soc. M. E.; N. Y. State Soc. of P. E.

William W. Brush, New York. N. Y. State Soc. of P. E.

Joseph Barnett, Bronxville. Westchester Eng. Soc.; N. Y. State Soc. P. E.

Harold G. Rice, Rome. N. Y. State Soc. of P. E.

John C. Riedel, Brooklyn. Brooklyn Engrs. Club; Municipal Engrs. of N. Y.; N. Y. State Soc. of P. E.

Arthur V. Sheridan, New York. Assoc. of Engrs. of N. Y.; N. Y. State Soc. of P. E.

John M. Weiss, New York. Am. Inst. of Chem. Engrs.; N. Y. State Soc. of P. E.

R. M. Boynton, New York. Am. Assn. of Engrs.; N. Y. Chapter A. A. E.

Wm. F. Kavanaugh, Syracuse. N. Y. State Soc. of P. E.

John H. Lawrence, New York. Am. Soc. M. E.

F. A. Burdett, New York. Am. Inst. of Consulting Engrs.

N. A. Richards, New York. Structural Engrs. Soc. of N. Y.

H. C. Baird, New York. Am. Inst. of Consulting Engrs.

F. B. Crocker, Syracuse. Syracuse Section, Am. Soc. C. E.

Eugene Stern, New York. Structural Engrs. Soc. of N. Y.

C. H. Stengel, New York. Am. Inst. of Consulting Engineers.

Joseph M. Lonergan, Jamaica. Municipal Engrs. of N. Y.

Raphael J. Smyth, New York. N. Y. State Soc. of P. E.

Edgar A. McKenna, Jamaica. N. Y. State Soc. of P. E.

The License Law in Effect

In an action brought by one Emelio Pitterilli, self-styled engineer, against Michael Del Balso, prominent New York subway contractor, for engineering fees claimed by Pitterilli and denied by the contractor, Judge John F. O'Neill, presiding in the ninth district Municipal Court, on January 14th, dismissed the action on the ground that the plaintiff was not licensed to practice engineering in the State of New York. The attorney for the defendant was Harry Merwin of the firm of Bender, Haas & Collins of New York.

The plaintiff not only loses his suit but invites attention to the fact that in violating the law he is liable for prosecution and the penalties attached to the violation of the law.

ENFORCING RESPECT

An object lesson in individual initiative in enforcing respect for our license law and for our professional designation is presented in the following incident reported by Col. F. A. Molitor.

He was walking along a street in New York when his ire was aroused by a sign bearing the words "Plumbing Engineer." Entering the shop, he challenged the right of the proprietor to call himself an Engineer. The plumber was surprised to learn that it was a violation of the law to employ the designation Engineer without the professional license.

P. S.: He promptly took down the sign.

If every licensed Professional Engineer would constitute himself a "committee of one" to challenge unlicensed practice and unlicensed use of the designation "Engineer," proper respect for our license law and for our profession would be speedily advanced.

As you walk through the streets of a city, you will see shop windows bearing such signs as "Radio Engineer," "Engineer and builder," "Contractor and Engineer," "Engineer and Architect," and the like. The odds are a hundred or a thousand to one against these men having Professional Engineers' licenses. Challenge their right to call themselves "Engineers," inform them that it is unlawful to offer to practice engineering without a license, and advise them to remove the offending signs. If you meet with refusal, report the case to the State Society of Professional Engineers or to the State License Board. These bodies will back you to the limit in the enforcement of the law and in stopping the misuse of our professional designation.

PROFESSIONAL MEN LISTED IN "WHO'S WHO"

Out of a total of 28,805 biographies of prominent men recorded in "Who's Who in America," the respective numbers of men listed for various professions and their percentages of the total are as follows:

	Number	Percent
Engineers	2553	8.8
Physicians	2116	7.3
Other Scientists	3889	13.5
Lawyers	4379	15.2
Architects	305	1.1

For the 2553 engineers listed in "Who's Who," the classification is as follows:

	Number	Percent
Total Engineers	2553	100.0
Civil Engineers	742	29.1
Mechanical Engineers	603	23.6
Electrical Engineers	455	17.8
Mining Engineers	543	21.2
Chemical Engineers	154	6.0

IS ENGINEERING A LEARNED PROFESSION?

For those listed in "Who's Who in America," the proportion of college and university graduates among engineers is 79.4 per cent; for all non-engineers listed, the corresponding proportion is only 63.7 per cent. Of the engineers, 86.5 per cent attended college; of the non-engineers, only 77.4 per cent attended college.

The 2553 engineers listed in "Who's Who in America" received 3905 academic and honorary degrees, or an average of 1½ degrees each, not counting the professional degrees of C.E., M.E., E.E., E.M., or Chem. E.

Of the engineers listed, 75 per cent have bachelors' degrees in science, 69 per cent have masters' degrees in science, and 40 per cent have doctors' degrees in science, a total of 2497 degrees in science.

Of the engineers listed, 38 per cent have degrees in liberal arts, 19 per cent in philosophy, 9 per cent in law, a total of 1417 degrees in branches of learning other than scientific.

Of the engineers listed, 150 are Doctors of Law, 289 are Doctors of Philosophy, 283 are Doctors of Science, and 86 are Doctors of Engineering.

THE ARMY INTELLIGENCE TESTS

During the World War, in one huge testing program, nearly two million men were given psychological tests to determine intelligence rating. The results of these U. S. Army tests yielded the following average intelligence ratings for the various professions and occupations. Professional engineers showed the highest ratings.

Occupation	Average Score
Professional Engineers	274
Lawyers	252
Teachers	252
Students	239
Dentists	229
Draftsmen	206
Chemists	205
Artists	198
Druggists	192
Clerks	175
Salesmen	170
Surveyors	165
Telegraph and Radio Operators	165
Photographers	159
Drug Clerks	149
Builders and Constructors	149
Enginemen	147
Airplane Builders	140
Riggers	139
Merchants	138
Gas-engine Mechanics	129
Telephone Operators	127
Auto Mechanics	122
Electricians	122
Musicians	119
Policemen	119
Butchers	118
Plumbers	117
Pipe Fitters	116
Structural Steel Workers	109
Machinists	107
Bakers and Cooks	106
Railroad Workers	106
Chauffeurs	104
Painters	103
Printers	99
Lumbermen	96
Carpenters	91
Sheet Metal Workers	88
Farmers	73
Laborers	63
Barbers	65
Teamsters	72

ENGINEERS AS EXECUTIVES AND ADMINISTRATORS

That the American Engineer, besides being an expert on design and construction, is also a good executive and a successful administrator, is shown by the following facts and figures reported by L. W. Wallace and J. E. Hannum from an analysis of the biographies in "Who's Who in America" (1928-1929).

Of the 2553 engineers listed, 1128 occupy positions as presidents of leading industrial and financial companies, 647 are vice-presidents, 117 are chairmen of boards of directors, 909 are directors, and 271 are managers of such financial and industrial organizations.

Of these companies thus officered or directed by

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ENGINEERS AS EXECUTORS

(Continued from Page 19)

engineers, 848 have assets totaling more than 90 billions of dollars; 683 of these companies realized gross earnings of over 17 billion dollars in 1928.

The assets of the 116 banks and trust companies officered by these engineers represent one-quarter of the total assets of the 26,213 banks in the United States.

The current assets of all the railways in the United States, according to the Interstate Commerce Commission, are 27 billion dollars. The 132 railways officered by engineers have assets of 24 billion dollars, or 90 percent of the total.

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EXAMINATION OF CANDIDATES

(Continued from Page 7)

time but no application that is received less than 20 days prior to an examination will be considered until after that examination is held. Applications should be made on forms provided by the Department and filed with the Professional Examinations Bureau of the State Education Department. All evidence of professional experience and responsible charge of work should accompany applications. Each application must be accompanied by a fee of $25 and must be verified by oath. It must show that the applicant has the qualifications enumerated on pages 5 and 6 of Handbook 36.

The program of the examination for land surveyor's license will be as follows:

Fri. 9:15-12:15 Mathematics
1:15- 4.15 Surveying

The passing mark in each subject shall be 75 per cent.

A candidate who fails in one subject shall be reexamined in both subjects. Not more than two complete examinations shall be taken on one fee.

Scope of examinations. The written examination occupies one day. Part I (mathematics) is given in the morning session, and Part II (surveying) in the afternoon session.

Part I—Mathematics (including advanced algebra, logarithms, plane and solid geometry, analytical geometry, plane trigonometry, spherical trigonometry).

Part II—Surveying (including theory of surveying, practice of surveying, limits of precision, use and care of instruments, adjustment of instruments, surveying computations, traverses, computations of area and error of closure, mapping, land surveying, precision surveying, city surveying, highway surveying, railroad surveying, base lines and triangulation, geodetic surveying, determination of true meridian, magnetic declination and variation, determination of latitude and longitude, hydrographic surveying, land boundaries and monuments, sub-division of lands, deed descriptions and conveyancing, surveying law).

ENGINEERING A LEARNED PROFESSION

(Continued from Page 9)

These facts, well known to Engineers but not to laymen, are aptly summarized in the statement by President Hoover: "Engineering has become the most difficult profession in the world, one which requires exhaustive study and training, and which eliminates more men in its course of training and subsequent practical application of learning than probably any other profession."

Engineers of former generations, before professional schools became generally available and before engineering education had reach its present stage of development, often by necessity received their principal training in the school of experience. They supplemented their native talents with self-

education, and they learned from the older master-builders under whom they received their training and experience. Since then, however, the situation has changed. The scope and content of engineering science have become so vast that even an intensive four-year course in an engineering college is barely adequate to provide the necessary equipment of basic professional education.

Against this picture of Engineering as a learned profession, our present licensing law in New York State is woefully inadequate in respect to specifying educational qualifications for engineering practice. Without knowledge of the higher standards actually maintained by our Licensing Board, non-engineers have been led to misjudge our profession, and legislators have been misled to enact or retain discriminatory legislation.

As a contribution toward correcting the misconception, the following statement has been officially issued with the endorsement of the State Department of Education:

"The State Board of Licensing for Professional Engineers does not accept a record of professional experience as being of a character satisfactory to the Board or as warranting the issuance of a certificate unless such professional experience has a background of preliminary and professional education commensurate with the modern requirements of the competent practice of the profession of Engineering."

In line with the prinicple thus set forth, a comprehensive system of written examinations has been established by the Engineers' Board to test the educational qualifications of applicants for licensure.

The next urgent step is to amend our license law so as to raise the present grossly inadequate and prejudicial statement of qualification requirements to a standard that will more adequately represent the actual qualification standards of our profession. The fact that Engineering is a learned profession must be unequivocally recorded in the law. It is planned to specify graduation from a recognized college of engineering, or the passing of a comprehensive licensing examination, or both, as a pre-qualification for engineering practice.

Every member of our profession is expected to have a thorough cultural and professional education. This fact must be brought home to the public.

Recognition of Engineering as a learned profession is a pre-requisite to proper public recognition of the Engineer.

MORE EFFECTIVE REGISTRATION

(Continued from Page 10)

training, should be placed on a par with the college graduate insofar as educational qualifications for admission to registration are concerned? We see absolutely no reason for such discrimination. So long as the bars are kept down to where men may enter the profession without proper preparatory training just so long will the engineers be without a dignified professional status.

The argument may be put forth that the Board of Examiners can make these examinations so hard that even college graduates, out of school several years, would not be able to pass them, thereby making engineering a closed corporation to all but college graduates. While such a thing is possible we do not believe it is an argument that merits serious consideration. It is to be presumed that men will be chosen to these boards who are experienced enough to know what fundamental knowledge of engineering applicants for registration should possess, and who are broadminded enough to give everybody a fair chance. To presume otherwise would be a reflection on the integrity of the profession. It is not the object of registration to restrict the free flow of engineering talent but rather to raise the ethical and educational standards of the profession.

Engineering is today far more exacting in its technical requirements than it was in the past and the technical demand on the present day engineer is many times greater than it was on the pioneers of the profession. True, the past has seen scores of engineers come up through the ranks and reach the top rungs of the profession and there will undoubtedly be men in the future who will do the same thing. To know or to have known these men is to know that they have lamented the lack of a college education in engineering many times during the course of their professional practice. The position of the non-graduate engineer is becoming more difficult each year, while opportunities for a collegiate engineering training are greater today than ever before. The young man of today who has a natural engineering bent realizes this and will, as a rule, see to it that he gets the proper collegiate training as a background for his professional career. There is therefore little to fear today that registration laws will keep promising engineering talent out of the profession.

Registration of engineers has not, to date, accomplished all that its proponents predicted for it. This, however, is not the fault of registration or the principles underlying it, but rather the fault of a lack of proper support from the profession itself. No efforts for the betterment of the professional status of engineers, or for that matter of any other professional group, can hope to succeed so long as there is concerted opposition from within the group itself.

Registration is not alien to the philosophy on which the engineering profession rests, rather it is in harmony with that philosophy. Broadly speaking, the philosophy underlying the profession of engineering, like that of any other profession, is to furnish society with a group of men trained along certain technical lines in order to meet certain physical and social problems inherent to our modern civilization. The philosophy underlying registration has for its object the public welfare through the establishment of a barrier against the

(Continued on Page 22)

MORE EFFECTIVE REGISTRATION

(Continued from Page 21)

incompetent, unqualified and unscrupulous of the profession exploiting the public. It is the same philosophy that prompted the legal and the medical profession to adopt licensing to free their ranks from the incompetents, shysters and quacks. It is the same philosophy that prompted the Government to register its voters to find out who are qualified and who are not qualified to vote. The philosophy back of registration is to select only those who are fit and competent to deal with the welfare of the public from an engineering standpoint and to so certify them.

The registration of engineers is rapidly becoming of major consequence to the profession. With the profession realizing that registration of engineers is here to stay, and with the growing tendency for more effective registration laws, we may expect to see in the near future many of the states now having registration laws follow the example of the New York Board of Examiners.

Reprint from "PROFESSIONAL ENGINEER."

Note by Editor:—The draft prepared by this Society in connection with its 1931 legislative program calls for qualification of all candidates by written examination after 1937. This will place engineering on a par with law and medicine.

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A NATIONAL BUREAU

(Continued from Page 11)

these requirements. The Registration Act of British Columbia incorporates a training system for students, preparatory to examinations for the grades of Engineering Pupil, Engineer in Training, and Registered Professional Engineer, and these methods could be developed and utilized by this Bureau. In British Columbia every engineer or student of engineering is required to be enrolled under some grade, and if not so registered, he is not considered as an engineer in any sense. The proposed Bureau, with the co-operation of engineering colleges and the national engineering societies, may eventually establish a definite system of engineering education and training which would produce real engineers.

It will probably be claimed that engineers cannot get together on such a plan as here outlined. However, it has recently been demonstrated that even the different branches of engineering will work together for the betterment of the profession and the development of any movement for mutual benefit certainly depends on the united thought and effort of the profession. The recommended uniform registration law was compiled by representatives of five national engineering societies, has already been endorsed by eighteen engineering organizations and many valuable suggestions as to amendments have been submitted. This uniform registration law, after certain improvements are made, may be the means of rectifying practically all of the objections to registration, most of which are generally caused by defective laws. Incidentally the proposed Bureau could greatly assist in carrying out the intent of this uniform law.

If these suggestions should contain any ideas worth while the writer wishes the credit to be shared with the delegates of the National Council of State Boards of Engineering Examiners, Mr. George T. Seabury, Secretary of American Society of Civil Engineers, and the members of the Committee on Registration of Engineers of American Society of Civil Engineers, with whom certain features of this proposition have been discussed.

Comment by Editor:—The principle but not the details have met with approval of this Society.

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(Continued from Page 14)

way to the defeat of Mr. King by Mr. Bennett.

The new prime minister now finds himself caught between the Scylla of completing the waterway and the Charybdis of a policy which has no great leaning towards trucking and trading with Uncle Sam, when truck and trade can be diverted elsewhere. Just what the outcome will be is not easy to forecast, but Bennett is a business executive and an industrialist at heart and I fancy that he will extricate himself from the aperture between the upper and nether millstones and that the job will proceed, as and when the prime minister deems it in the public interest, for that is Bennett's way.

Fair division of the cost of development between the potential partner nations has been the subject of much discussion in both countries, all experts agreeing that the only economical mode of procedure lies in a combined navigation and power plan, the whole to be carried out by an estimated expenditure of $839,187,000. Of this figure $180,000,000 is set aside for navigation works to be carried on in the Great Lakes Division, of which sum Canada has already spent more than $115,000,000 for the New Welland Ship Canal, the remainder being required to deepen channels between the Upper Lakes and to construct a new lock at Sault Sainte Marie.

In the River Division, $658,487,000 is the figure mentioned, of which sum $270,000,000 will go into power and navigation development of the international river, and the balance into the developments in Canadian waters from the New York-Ontario boundary into the harbor of Montreal. Here again, Canada is already in the field and, by arrangement with the Beauharnois Power Corporation of Montreal, will receive a channel twenty-seven feet in depth, cutting through the Soulanges section, as part payment for power rights granted to the company, leaving only the construction of locks as a direct charge on the Canadian people.

Problems peculiarly national face each of the countries involved. In the case of the United States, the need of new transport routes from the middle west to the Atlantic seaboard is urgent. Canada, however, is in far better position in regard to railway facilities than is her neighbor and has no immediately acute need for full development of the all-water route.

On the power side, the United States can absorb at once her full share of the energy awaiting development, while Canada is amply provided with water power in the developed and undeveloped stages. Hence Canada has no spur to haste, while the rowels of need continually prick the flank of her neighbor to the south. Here is the clearest keynote to the delay seen on the one hand and to the repeated requests for action heard on the other.

Many suggestions have come from experts as to how the costs of the enterprise ought to be divided. In the final analysis it becomes increasingly ap-

parent that separation of navigation from power must be effected—even though construction is simultaneous, for economy's sake—leaving New York State to develop its own half of the international river and the Province of Ontario to bring the Canadian share of that section into production, while, down river, Quebec Province develops its power in conjunction with the dominion's installation of navigation channels.

This is the procedure at present in hand in connection with Beauharnois enterprise. Under some such arrangement the vested rights of all provinces and states concerned find ample protection and Canada will remain completely in possession of her own water power, the export of which commodity is banned under dominion statute.

The discussions in regard to distribution of costs directly chargeable to navigation have covered a broad field, but, briefly, two or three major factors can be said to govern Canadian public opinion. First, since Canada's need for the waterway is by no means as urgent as that of the United States, it follows as corollary that the benefits accruing to the republic will be infinitely greater than those for the dominion.

In the second place it must be kept in mind that although the United States enjoys equal privileges with Canada on the Saint Lawrence, the cost of the existing waterway has been borne almost completely by the northern member of the firm. Although the outlet from Montreal to the Atlantic is geographically Canadian in its entirety, it is almost equally American so far as rights in its use are concerned.

In the up-river zone, though equally enjoyed by the United States, installation and maintenance of navigation works has been almost entirely a charge on the Canadian people. Similarly the cost of the New Welland Canal, linking the Great Lakes into one huge navigation chain and permitting the passage of Upper Lakers as far east as the American ports of Oswego and Ogdensburg, has been borne entirely by Canada.

The attitude of the large body of Canadian public opinion which is not averse to mutual development, therefore, is that the cost of navigation improvements through the international section of the river ought to be borne by the United States. It is even held in some quarters that Washington ought to be asked to foot the bill for deepening and re-canalizing the Canadian river from the Ontario-New York line into the harbor of Montreal. Just how radical such thinking may be, I cannot say. It is offered here merely as a typical example of the almost innumerable plans mooted from time to time.

That partnership, in one form or another, will provide the ultimate solution, and that this solution will be forthcoming speedily I firmly believe, for geographically speaking, these nations are one entity, the need is present and trade must find its outlet as surely as water seeks its natural level.

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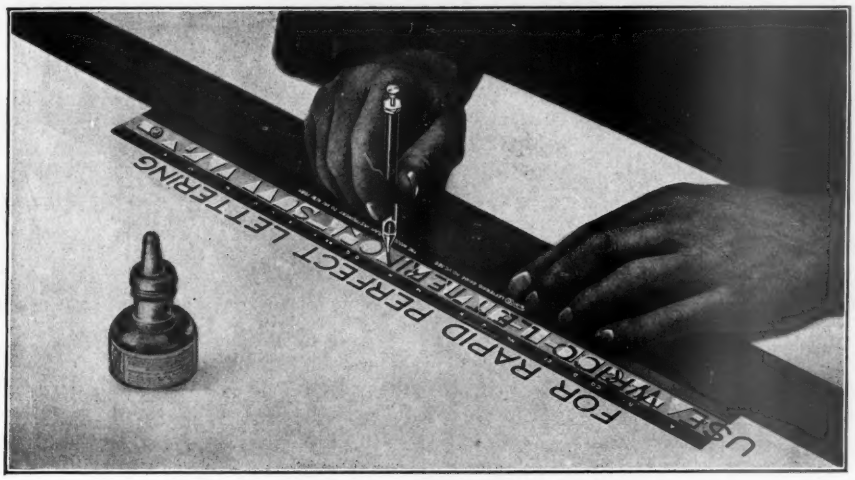

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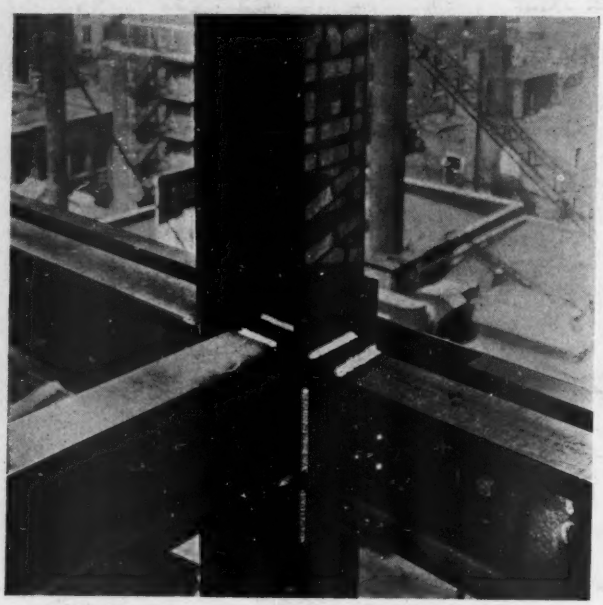

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